1956 - 3

doc. 470

UNITED STATES
DEPARTMENT OF THE INTERIOR

DI-6

APPROVED DECEMBER 1941

K.M. Waage 1956 doc. 470

Notebook 3

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Mayowoith Section – Dip

Begins within Rusty beds, measured down

0.6 to 1.0	Siltstone, Fe-impreg., "fucoidal", caps slope locally, brown to red- + purple-brown.
5.6	Shale, gray to black, fissile, some thin interbeds + laminae of silt, local Fe-stone concretions
5.6	Shale, clay, dark gray + green, weathers to popcorn crust. (Samples 1 + 2)
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0.5'	Siltstone, Fe-impreg, to ironstone - interval has concretionary, but silts rarely continuous.
18.5	Shale, dark gray to black, interbedded with thin layers siltst., chiefly in upper 10 feet, but some scattered throughout. Sample 3 = 1.0 to 3.0 from base.
2.0	Shale, silty, dk gray, irreg. interbedded with thin layer, laminae, + lenses of siltst. and ss. latter locally coarse to fine calc. Calc layers ripmixed + worm tracked, carb interbeds 'wavy' /

~1~

4.0	Sandstone, fine- to medium-grained with some irreg. interbeds & partings sandy siltst., gray to brownish with plant freqs. Sandst. chiefly massive betw. ptgs, beds to 1.0±, shot with vertical tubes from surface disconf. above. Weathers to crumbly ledge of yellowish to brownish gray.
2.8	Siltstone gray, carb. flecks, massive to irreg lam. locally, becomes sandy upward grading to SS above, and to shale below, weathers light gray, yellowish stain & Orange Fe stain on joints & fracture surf.
1.0	Shale, dk gray to black becoming silty at top
2.6	Coal and coaly to lignitic shale with 0.1' light brownish clay band 0.6 from top, and another loc. at base
1.7	Claystone, silty, black, loc. coaly.

11.5 Clystone, light grey to light grey green (clay-rich) slightly silty, becoming sandy at base. Soft to waxy, upper 6' mostly bright grey, some brownish mottling.

5.5 Clystone, calcareous with above but highly sandy - to clayey ss, light grey green at top to darker green grey at base. Qtz grains + some cht

5.5 Clystone, plastic, green, sticky, somewhat silty, some purple mottling in basal fract.

11.5 Clystone, purple mottled with green in upper 5'0, below is brick red to maroon pepper over tan to colour silty dust. Evident green in fracs.

6.8 Clystone, soft, waxy, silty green becoming siltier at base + grading to unit below.

2.6 Siltstone, locally very fine-gr. sz ds stone minor clay, friable soft basal 1.0 stained yellow, weathers white to yellowish, locally Fe impreg

zones in top.

3.0 Claystone, partially calcareous, gray, soft.

9.5 ± Sandstone [spotty], fine-grained, locally silty, with interbeds silt shale + shaly ss. Gray su white with brown-weath conc. masses with secondary calcification. Some marcasite nodules on top surface. Clayey & shaly interbeds break up unit in this zone. Basal 2.0 soft friable with yellow stain.

4.0 Claystone, silty, black to dk gray + brownish gray, locally with calc. frags.

6.6 Claystone, silty, gray to light gray some clayey siltst ~~at base~~ + silt beds

8.6 Claystone, black to dk brownish gray somewhat silty

4.0 Claystone gray silty, with 0.5 zone shaly siltstone at base

2.8	Claystone, silty, loc a clayey siltst. in upper part, becoming less silty, more waxy downward.
5.0	Claystone, black, plastic, weathers to black papery crust.
8.5	Claystone, banded shades green and gray, bentonitic
0.6	Siltstone, calcareous along bedding planes, green, stained OB
5.6	Siltstone, yellowish to greenish gray, with interbeds of greenish gray claystone and silty claystone, latter becoming slightly calc. at base
2.2	Marlstone, gray, weathers greenish gray
0.3±	Limestone, in irreg. grayish white powdery lenses
	Green claystone wash

EASTERN BLACK HILLS SECTIONS

Bear Butte section

Part A. Measuring up from the contorted siltstone in the Lakota.

Top of contorted siltst.

(4) 30+ 31.6 Partially wash covered. Upper 6 to 7 ft is siltstn, becoming clayey at base, light grey with rootlets in upper 0.6, and local heavy yellow ochrous Fe, impreg. Most of upper 6-7 ft is spherulitic. Below is silty variegated claystone, grey to light greenish grey mottled with red, some yellow in upper ½ and purplish grey in lower ½, basal 2.0 is light grey clayey silt grading to sndy siltst. below it.

(3) 9.2 Siltstone, grey, weathers grey-white, massive, interbedded with dark grey to black silty shale.

- 2.3 Siltst, massive, becoming clayey and sdy at top
- 1.2 Siltst, shaly, gray, plant frags
- 2.0 Siltst, massive, light grey
- 0.5 Shale, grey, papery, plant frags
- 3.0 Partially covered - chiefly massive light grey silt, plant frags (some roots to 1.)
- 0.2 Siltst., shly, carb, dk gr - black.

upper half grades to siltst. bot.

(2) 1.2 Sandstone, thinly interbedded with sandy siltstone, friable.

(1) 1.0 - 2.0	Sandstone, fine-grained, cross laminated, Fe. impregnated, weathers OB, forms ledge just below hill crest.
Part B.	Measuring down from contorted silt
2.2	Sandstone, very fine-grained to siltstone grey white, laminated, with laminae contorted by (subaqueous?) flow + slump, forms crumbly, distinctive white ledge
4.2	Claystone, light greenish grey, silty, in upper 1.2 becoming brick red in lower 3.0 and grading to grey of unit below.
12.0 - ?	Claystone, plastic when silty, grey at top grading downward to black, weathers to popcorn slope.
Slope wash	
Note - 1.	Float of polished pebbles - very sparse, (Sample 2 - incl vaes fossilif. goonoy) appears to come from top of contorted silt and above.

Note 2. Beneath the exposed dk gray clstns is continuous wash and grass except for few bare patches, one of which shows some white very sandy clstn about 6 to 10 ft below base measured section; another large patch had green clstn well out from base section

* There is no sandstone cropping between the measured section

Note 3. In field N. of Tail River bluff is series of dug holes in a gray siltstone which locally has some lignitic silt + shale at base, and, in pit nearest barns has at base a clay sand full of black chert granules + small pebbles. This calt layer is in line with section A + lies approx 70 ft. beneath the contorted siltst. bed - All this providing there is no faulting in valley between

This is base of white silt zone

Part C. - Fall River in road cut.

Begins at top of unit 3, Part A. which is nearly identical in road cut to its details in section A.

7.5 Chiefly obscured. Consists of thin bedded sandstone with interbeds of silty, shaly ss + silt st. Some ss beds are loc. Fe impreg. SS are fine-gr + micaceous, shaly silt + sh is also micaceous gray to brown, carb flecks common.

10.0 Covered

5.6 Sandstone, massive, fine grained loc. micaceous, friable, fairly clean. Some local Fe stain. Is gray-buff in road cut.

2.5 Shale, gray to dk gray, loc. brownish, with scattered carb. fragS.

2.0 Sandstone, fine-grained, friable, massive. with OB stained top — grades to overlying unit.

3.5	4.0	Claystone, light gray, shaly & finely silty becoming sandy with OB stain at base and locally at top — spherulites (Sample 3) in both positions.
4.5		Shale, gray, carb flecks, with thin interbeds and laminae of siltstone which is loc. fe impreg. Near top siltstn layers more numerous in become sandy.
2.0		Sandstone, very fine-grained, do silty, massive, buff weath with scant OB stain, & loc ironstone This unit holds up crest in roadcut. Above it (st. 2), on sw side of hill cut is on shale with silt interbeds & poorly exposed (Stinking Fall Rive.)

Section D. Measuring up from top of basal siltsto zone (unit 3 Sec. A) in Fall River.

14.0±	Sandstone, fine-grained to very fine gr. locally z silts. Chiefly platy w. interbed sandy silts. Lower 4'± some resistant Fe-impreg. beds. At top is silt to fine ss but more massive, tabular, with ripple-mkd bedding loc. – this unit at least 41' thick
1.0	Lignitic shale
2.5	Shale, gray, thin OB stained silt interbeds.
1.0+	Sandstone, fine grained, loc. Fe stained
1.2	Covered
7.3	Claystone, light grey, silty to sandy at base becoming gray upward, spherulitic & stained OB to yellow & red; upper 2.5 ft dk gray to black at top. In base, soft rusty concs. made of masses of spherulites.

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1.0 Sandstone, Very fine-grained, massive, buff-weathering bed with vertical "worm" tubes 10c.

② 19.5 Chiefly covered, scattered ledges Fe impreg ss in lower 4 ft. ± At top is 1.0± Fe impreg. ss., Float of worm-tracked siltst + ss.

① 5.6 Covered. At top is thin platy Fe impreg siltst + fine ss.

This is highest sandy bed exposed in section.

Slope wash.

Note - In rock cut Unit 2 well exposed, is interbedded siltst + silty sh. minor thin fine ss. Unit ① prob. same stuff.

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Sturgis –

A. Addition to Sturgis section of 1955

In 1955 section

Measuring up from base-obscured by slope wash + veg. below this.

(25.0) uncorrected for dip

Sandstone, fine-to med-grained, grizzly with some local whitish streaks + x-laminae that look like acc. of hard white claystone grains. Lo 2 silicified band about 8' from bottom exposure. Weathers grayish white. Some intraf. cgl of aphan. ss chips.

Claystone, sandy + sandy clots, gray, loc. stained rusty, numerous plant frags.

Eden School area.

Could pick: Fall R. + upper. most Lakota here. Upper Lak. massive ss has leased out to S + only conspic. Lakota ridge is held by platy sandy gray-purplish pink. siltstone with numerous plant frags. Well exposed in Eden School quarry. This unit is most prominent cropping unit of Lakota. from here Northward into St Onge quad - chiefly because it crops out well and is used locally as roadmetal. Beneath it ss intergrades with it - thickness ?, then ss + coal shale comes in. May be ostra. LS is Morrison. (doubtful)

Eden School area.

Section of beds on scarp E across Eden School road from entrance to V.G. Morrison Flying V Ranch. Dips gen. ± 5°-9°

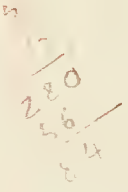
80.± Sandstone

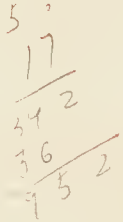
Measured from bridge on road ± 5 to ± 5 stream, gully

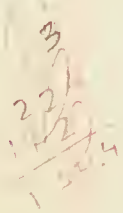
20.0 Covered for most part. Float of siltstone chips, sandy, in base 10.0± upper 4.0 is a dark gray slightly silty claystone which is capped locally by 1.0± of Fe imp. cgl. 0.8 weathering layer of ss.

15.0 Covered. At base, or about 2' above ss at top unit below. Silty to sandy brown-sh gray shale - prob. a dark gray, dug out. Top of this interval is at highest occurrence of ls chips in float + is about on gray-white ls beds that come in within the upper ostracodal shale.

52.0± covered to ss capping







South along strike this upper ss (which is at base of Censure silt interval) consists of a double bench totalling 13', with another thin bed in about 15' further up.

Here head leveling ⊥ strike & elevating for 5° dip and estimated 95 feet of section between lower ss and base this ledge. However not positive start was at top lower ss.

Measurement of Lakota siltstone — An approx - leveled thickness measured from road through Eden School Quarry + up next ridge down dip is 130 feet. But suspect fault at Eden School, if so could be as little as 85, but no less, so 85 to 130 are limits

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St Onge Quad NE of Whitewood (Old 62500 St Onge sheet)

SW¼, sec. 33, T. 7 N., R. 4 E., Lawrence Co., SD. The Lakota silt has been quarried along rd. Sections from silt to Fall River contact (see topo sheet).

Section A begins in pasture gully S of rd within the siltstone.

Gulley bottom - measuring up (6' drill tape used)
N - measuring back toward

5.4 – ? Siltstone, massive, grey locally with faint greenish, purple + pink tints. Weathers grey-white. Has cap of sandy silt. 0.1 ± with interbedded ripples. Locally thickens in small roll which may be bed structure or stratum. 5.4 ft measurement in this unit.

3.0 ± Siltstone, purplish grey, massive, with some thin interbeds of platy siltstone in lower 2.0. Has clayey silt + silty clay in upper part which grades up into siltstone. Weathers light grey, locally greenish in upper part.

4.0 ± Alternations, chiefly grey, finely silty grades to unit beneath

14.5 ±	Claystone, gray, with greenish to bluish, occ. purplish cast. Lower 3.0 ± green. Vzv. red, upper 3 to 4 feet light greenish gray vaguely mottled with red & purple.
→ Lsd Mbr.	pres. in hole.
17.5 ±	Claystone, gray, finely silty, some light green mottling.
7.0	Claystone, variegated shades red pur. purple on gray, minor green, some ostr. in top. silty to finely silty.
2.0	Claystone, silty, grading up to clayey silt., locally gray stained yellow by Fe, some concretionary spherulites
1.0 ±	Claystone, silty, gray to black, carbonaceous, grades to unit below.
4.0 — ?	Sandstone, massive, fine-gr., friable in lower 0.8 ±, caps several small buttes in vic. to tabular

(Interval top Lakota silt to contact with F.R. is 51 feet)

Section A offset 1 - much more clearly exposed.

Measuring up from top siltst.

5.8 Siltstone, purplish gray, with some silty clstn, weathers crumbly gray-white above hard siltst bed. Grades to dark gray silty clstn at top with local OB stain.

12.0 Claystone, dark gray, silty at base becoming black in upper half, but about 11.0 from base red zones 11.0 to 11.5, then light gray, white-weathering zone, Latter is silty and has some red mottling, grades to unit above - also grades to it laterally, locally

41.5 Interbedded light gray clayey siltstone, soft, and hard beds very fine grained, local calc. sandstone up to 1.0 thick which weather, brown to grayish brn. (Ihis unit local

In gullen E of offset 10 to 12' of siltst. exposed. It is clean siltstn with few thin shaly carb layers in upper 6 but lower 6 is mixed with finely sndy siltst, gray, CB-weathering

B In SS capped butte to N across road, the SS bed of offset 1 can be picked up in slope. Above this all clstn slope to contact. Clstns somewhat more colorful with pinks + reds in some of gray of Section A, but still a definite variegated zone in upper 12 feet.

Measuring down across contact from top of butte.

6.0 - 8.0 Sandstone, massive, very fine-grained, little tabular struct. Silty at base where lower 0.4 for Fo imprints. weathers yellowish gray

1.0 Siltstone, gray, carbonaceous loc. at base

3.0 Clay stone, light brownish gray, slightly silty spher. lime. Upper 0.1 is bright O stain.

and other spots of sand in this unit

8.0 ±? Clay stone, variegated, red, pink + various grays.

Note - A few polished pebbles, incl. one perfect tricanter found in float, coming from interval between contact and the thin ledge Labrate ss[tuff] of offset 1.

Spring Creek section — SE-SE-NW-30-T6N, R5E,
Sturgis quad (7.5) West bank of creek behind old Morrison farm. Probably basal Lak-Up, Morrison.

Measuring down from first massive sandstone on slope above stream cut. (Dip is under 10° here)

9) 3.8+ Sandstone, fine-grained, massive, quartzose, some scat. black minerals, weathers yellowish to brownish-gray white.

8) 13.0 Covered - basal 1.0' is sandy gray claystone which grades up to a dark gray to black plastic (nonclay) claystone about 5' above base. Above is mainly weathered.

7) 2.0+ Sandstone, fine-grained to silty, with local inclusions of underlying siltstone or claystone blocks; chiefly platy, irreg. bedded, weathers brown to olive gray. Grades to unit below.

6 6.5 Siltstone, finely sandy, dark gray, obscurely cross-laminated, forms irregular fracture at base at top of stream cut; weathers gray-tan, is buff-gray.

4	26.0±	Claystone, gray, fine-grained silty, waxy, very uniform, some iron locally stain red and/or top, powdery yellow, calc. throughout.
4)	4.0±	Limestone, tan to light gray, very fine-gr, with upper 1.0± ft of highly calc. clayey shale silt which weather light yellow brown and contains, at base lenses of underlying gray ls. [illegible] to coarsely [illegible] upper ½ to silty. Some have ls conc.-cgg sized
3)	1.0	Shale, calcareous, becoming silty in lower 0.5. Greenish gray, ostracodal (Sample 1)
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2)	1.5	Claystone, calcareous, greenish gray, grades to shale above, ostracodal at top — locally could be called 2S a marl with irreg bodies clayey ls. and some hard-cgg-sized ls. conc.
1	0.5±	Shale, calc. [illegible] silty.

Uzis, overlies [illegible] to creek bottom.

Eden Scout section A. - SW SE SE sec 19, T6N, R.5 E., Sturgis (7½) quad. in local badlands

Measuring up from top upper Lakota siltstone
Dip under 10°

1)	7.0	Interbedded silty claystone & argillaceous siltstone, purple at base, light gray above, silty stuff irreg. distrib. clasts predom. considerably O-B staining in upper foot ±
2)	8.5	Claystone, gray to black, choc. black in upper 5 ft, plas., waxy loc. smudgy ~~s~~ ±. (rel. ~~s~~ pebbly loc. in float)
3)	5.0	Claystone, fine & silty, gray & coom ~~gray~~ with some minor red mottling and O.B. staining, upper 1.0 heavily stained yellowish OB.
4)	0.5 to 1.0	Siltstone, and silty claystone, silt in irreg, lumpy masses. Gray.
5)	6.3 ±	Claystone, gray, slightly silty, with local OB to olive yellow stain in streaks. Weathers to relatively smooth surface

6)	13.0	Claystone, red in lower half, becoming variegated purple, red, gray & yellow in upper half
7)	3.5±	Siltstone, clayey, gray to dark gray very fine silt lacking plasticity, weathers to white popcorn surface, has a few siltstone irreg masses.
8)	11.5	Claystone, silty, variegated, gray, + few thin red in lower 2,3. Upper third chiefly light gray splotched with red & yellow
9)	8.3	Claystone, silty, light gray, with orange to yellow staining in splotches - chiefly in upper 5', and scattered concen. of spherules. In upper part this is more of a silt than a clay.
10)	1.6	Shale, silty, lignitic & = shaly lig silt.

v) 1.1 — Siltstone, micaceous, gray, hard, forms gray-white crumbly ledge, some O-B stain.

iv) 2.0± — Shale, black, silty fissile, becoming Saltier at top

iii) 3.1 — Sandstone, very fine-grained - prob should be called a siltstn. Massive, ledge forming, weathers light grellow-brown has Fe stone cones in upper surface. Bezel 0.7± is soft brown shaly.

Slope wash with typical Fe River Fe stone rich worm-tracked silt float.

Note - polished pebbles in float on lower gray claystone - few and not found in float above top of it

Partial section in bluff S of dl road to N off Edna school road in about center NE 1/4, Sec 25, T 6 N, R 4 E.

Measuring from 55'# 2 (the one at Morrisons gate ? top Spring Co section), down,

17.0 + Sandstone, actually ± calcareous sandy zone - (local 2') ± local at base about Ea 0 2. top covered sandy clasts between, very fine-grained, massive - about, weath. top has angular pebbles in irreg. masses.

17.0 Covered, pieces of gray silty, noncalcareous claystone, and gray siltstone (later about 5.0 from top).

2) 41.7 Siltstone, sandy, massive, fossiliferous locally; locally weathers gray to C3 has coarse matter locally, few intermixed sandy zones.

1) 2.0 - ? Silts. and blacky, dark gray, continuous with above but slope washy. softer, not in ledge.

Turn to Sec. Siltstone ledge unit 2 down to is in gutter it is 50.0±
This line has marlstone above it, may or may not = is in basal Spring Creek section

Tilford quad – South Sturgis reconnaissance

Upper Pleasant Valley Sch. Sand pit – SE NE sec 31, T5N R6E.

Sand pit is in the Lakota silt interval and has typical silts capping it. It is friable, well sorted medium ss, x-lam with some clay coating grains, weathers white. Sample (Pleasant Valley Sand pit). Same unit as the loose sand underlying the siltstone at Eden School. Above it is covered slope on covered cliff to contact, which is locally easy to see because of 2 to 4 ft ledge ss in basal Fall River just short distance above contact. To west in pine covered ridges at least 2 separate Lakota ss bodies come in but no chance for section

Sec. 4 T.4N R6E along S border of section. (See map) Here typical rooted well exposed with basal Fall River silty & carbshly silt. Then very Lakota to horizon of [illegible] silt. At this horizon locally 10–15 feet of hard sandy silty with interbedded light gray clay. Top contact is light gray clay to purple beds of top Lakota silt.

Sec. 16, T4N R6E

Hill crest to S is fine exposure of cgl, none to N of road right here, but a few ft. further, secondarily, calc. ss in which is persistent & which may either be beneath the cgl, & channeled by it, or be above it loc. Down hill short distance is comes in thin wavy & silty reddish ~~distn~~ thin grayish ss on a massive ss which probably = that at base of volcanics & is interval of Flying V ranch near Eden sch.

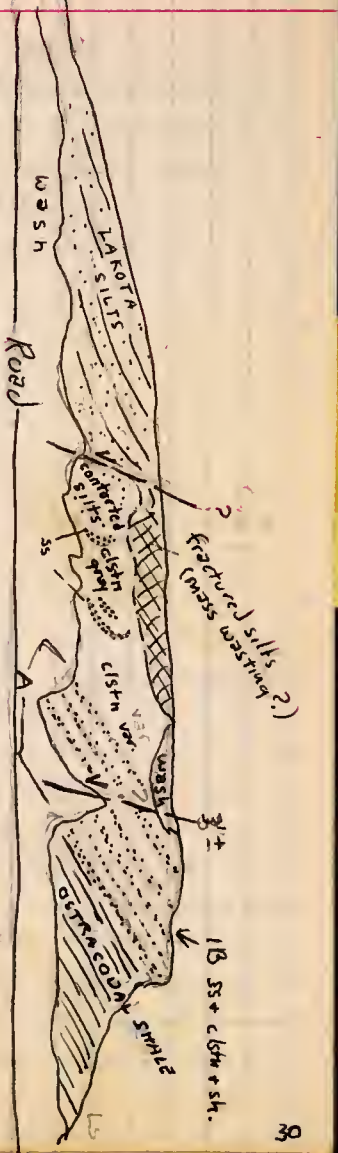
Whitewood Road cut in Lakota

Ostracod shale or silts.

25 ± Sandstone interbedded with shaly siltst & silty sh. & salty clstn (interval A of diag. rev. for text)

4.6 Shale, slightly silty, gray weath to lite gray & off white in upper 2.6, lower 2 brownish to red, with base 1.0 z red, gyp, cl. Some ostracods about 2.0 from base. Base is silty gyp layer filling cracks in red clay. Whole unit non-calc.

4.0± ~~Shale, calcareous~~ ± clst, olive gray, ~~ostracodal~~, with zones massive marlstone. Chiefly massive " ". some [illegible] loc., thin beds olive is at base. Ostracods rare.



3.5 — As above but softer, brecciated shale downward, grading to below,

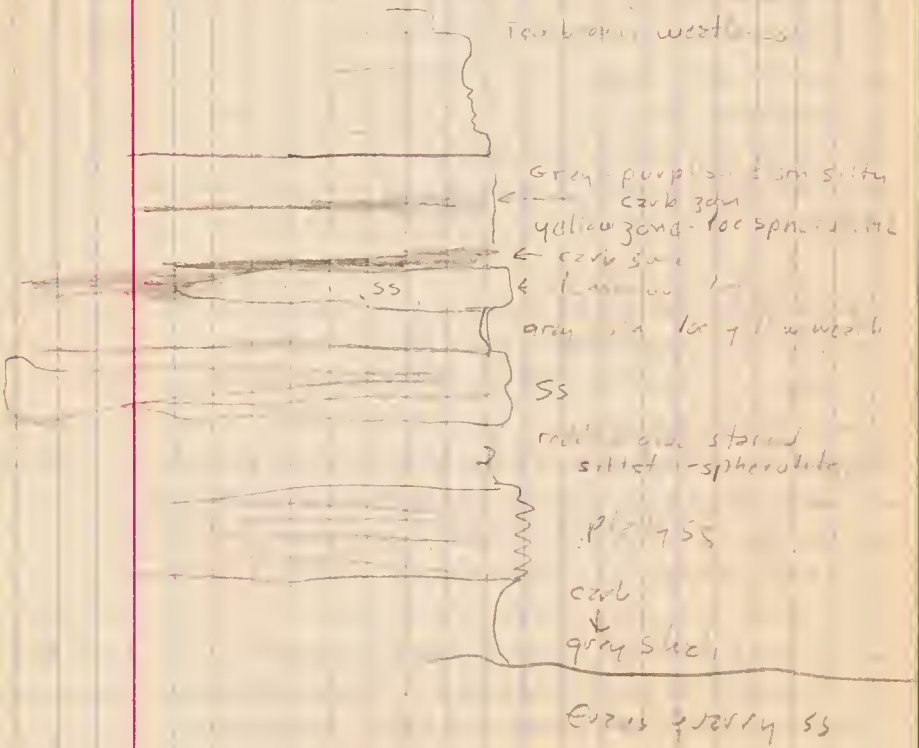
18.0 - ? — Shale clay, fissile, fairly dark olive gray with fossils, calcareous, ostracodal (Sample)

(7787)

Slope wash

Hot Springs Area

Type Fall River - re-examination of variegated and coaly beds beneath the thick ledge of red-brown weathering thin-bedded ss.



Possible that this may only be upper Fall River interpreted as Fall River with coals in again at Sunset Canyon well under var. zone.

This is correct - See p. 44

= (MP-70)

Angostura dam section — measured in exposure in SW-facing ledges under high point just SE Angostura dam in SE cor NW¼, sec. 20 T 5 S, R 6 E, Angostura Reservoir quad., S D. Begins just above water level (about 8' ±) at distinctive ledge very fine grn. ss. Measured up.

① 0.4 – ? Claystone, silty, dk gray, some greenish cast, with circular, flat patches white silt(?).

② 0.8 ± Sandstone, very fine-grained, massive white weathering, sparkly, with numerous dark red grains.

③ 4.0' Claystone, dark gray to greenish gray, dk purplish silty. Base 0.3 – is sandy; a bed of finely sandy silt. & loc. ufss 0.4 thick lies about 1 m above base.

④ 0.7 → 2.0 Siltstone, light gray, to white irregularly lam with silty to sandy clstn, forms massive blocky bed, loc. qtz. to vfgr. Has Fe specks.

⑤ 45 → 50.0 Sandstone, massive, cross lam to cvs, rounded.

(5) Base is conglomeratic, w/ stringers of pebbles in massive ... sandy ...

in base 1.10 ± foot. Incl. ve, vertical. chert + qtz pebbles up to 900 ces - few of which seen in place, some show they were fractured prior to [illegible] fract. surfaces not polished. Als. clay irregularities + irreg silt + calcite masses up to foot ± in diam. locally with coal (PS-1)

(5A) Thin, irreg dk gray shaly parting laminations tops calcite zone, show. ss ranges from med. to very fine upward with some lenticular streaks and lam. of clay shavel below about 13 ± 25 feet. The cross-bedding in lower part is dominantly approx ENE with WSW curren.

5B Upper 20'-25' has much interbedded silt + shaly clay locally, which is greenish to purple red. As in [illegible] sections are massive + appear to have clay coating on grains. Possible upper 20-25' should be separated unit but gradational lateral + vert. as well as vertical. Upper part mixed with lighter yellow brown [illegible]

(6)
7.4 Siltstone, sandy, greywhite, in irregular beds + lens's interbedded with dark grey sandy shale. in base part and grey sandy clay above.

(7)
9.0+ Cream siltstone, hard, clayey, and silty to sandy claystone, grey, weathers light grey, massive with blocky to subconch. fracture. Bedding less sandy + shaly upward.

(8)
3.0+ Obscured by weeds. Patches show clay gouge, hard, waxy, silty, mottled light + dark grey.

(9)
2.8 Claystone, minor silt, slightly sandy, soft with local areas very hard, irony, arenaceous

(10)
0.6 Claystone — zone of hard clayey pellets, rounded, in soft, clayey matrix, sandy clay-filled tubular structures - quicksand?

(11)
8.0 Siltstone, light gray, massive, blocky to subconch. fracture, sandy in base part. Becomes darker upward + more clayey at top is dark greenish gray

grades in unit above

(12)
3.5 Claystone, ~~dark~~ green on gray, sandy & silty in basal half, soft at top.

(13)
1.0 ± Claystone with clstn pellets in clstn. (Sample 1) Grades to unit above & below. Is spottily sandy has cuny grains & granules as well as rounded clstn. Also many red spots but contains spherulites. May occur as irregular lens or beds in this part of section. Not in well-defined beds.

(14)
2.7 Claystone greenish gray, with irreg thin stringers silty and very fine ss.

(15)
0.1-0.2 Sandstone, very fine gr. clean friable ss. Fe OB coating & stain. Chiefly qtz, some chert.

(16)
7.0-8.0 Claystone, grading from greenish gray at base thru gray to light gray & silty at top has irreg laminae & streaks

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sand locally, some purplish, mott. & locally abut 3' from top. A doubtfully spheroidite zone comes in about 2' from base (Sample 2).

Locally at top it is chiefly a light gray siltstone, massive, locally with gyp. stringers & yellow stain

(17)
0.5 to 1.0

Sandstone, fine to coarse grained, hard, dark gray, calcareous, weather brown. Locally has granules & chips clay and some fairly large chert grains, to massive bed.

(18)
9.0

Interval.
Interbedded, calc. silt, and very fine grained sandst & clay. Locally some fissile clay, silts with pyrite fossils and some silty dark gray to carb. shale.

(19)
35.0

Sandstone, chiefly fine to fine grained and salt, lenticular, cross-lam. with [illegible] Has pyrite & clay granules & well rounded quartz. Much ripple marking

one "worm" tracemaker & burrowing including long thin vertical tubes up to 2' long ... some of the channels beds.

Silt contact both at base and top is very variable. Locally this unit grades laterally into upper 5' of underlying silts - at one place this is very abrupt & may be channel. ~~Cut~~

Color weathered is light brown. Some OB beds, some light gray where silt present. Whole is rather distinctive Fall River zone.

Upper 4.0 is dense silty to silty shale, horizon Fe stained locally. Bed locally lat. to ss.

(20)
5.5 Shale gray, finely silty with laminae silt st - sandstone beds (sometimes) at base. Top is apparently leached for 1.0' where is light gray with ferruginous layer 0.2 at base.

(21)
24.0 Sandstone, massive ledge, cliffy weathered, with clay pebble cglc zone 2 base which is ~~not~~ irregular. Ic cross structures chiefly, under

0.2 loca... Whole weathers to brown clay, vertical tree on jointing pattern

(22)

10.0 - 12.0 Sandstone, [illegible], [illegible], [illegible] with [illegible] plates, [illegible] fresh, massive fuzzy, plane stratified at top. Weathers OB to reddish brown, surface [illegible] light grey, yellow brown and [illegible] upper half which grades to [illegible] (Thickness of unit varies laterally, [illegible] at expense of overlying bed.

(23)

6.6 Siltstone clay [illegible], becomes shaly [illegible] pale, and carb. so that beneath the basal foot 1 is a laminite shale. At top becomes sandy. Weathers like a clystone is grey, weathers white.

(24)

2.0 Siltstone, minor very fine ss, clayey hard, lower half forms little ledge locally, upper half softer with bright yellow to OB stain

(25)
2.5

Whole is gray to dk gray fresh.

Siltstone. very fine, slightly clayey to clay. upward, gray to dk gray, sandy, loc. shaly

(26)
10.2

Claystone, mottled red on light greenish gray, sandy, in basal 5.0 ft, less red mottling above and clasts is gray. Locally Fe speckled

(27)
4.0

Siltstone; clayey and silty claystone, gray to greenish gray with red and yellow stain and concentrations of red Fe. Locally spherulitic. Abund 3 mm tops, and abund stains of very fine

"FALSE CONTACT"

(28)
0.3

Shale, black, silty, local

(29)
2.2

Sandstone, very fine-grained, local basal silts and. Irreg lam, gray to white with carb streaks. Weathers gray-white to light brown

(30)
2.5

Siltstone, locally fine sandy, in irreg beds with much Fe

impregnation resulting in black to purplish weathering beds. Upper 0.5 is platy micaceous siltst. with crumb fracture, weathers purplish gray.

(31)

1.3 Shale, gray, very silty, yellowish stain at top grades to siltst below

(32)

0.8 Shale black, fissile

(33)

3.0 Siltstone & silty shale interbedded + interlam., sh. dk. gray, purplish stain overall. Basal 0.3' is bed very fine gr. sandstone, platy.

(34)

7.0-8.0

7.5 Covered. Within this interval change to platy fine gr. ripple-marked ss + interbedded siltst

(35)

2.0 to ? Sandstone, massive, fine-grained, weathers gray-red, caps ledge

Top of exposure.

Hugoslure offset 1

this must be the contact

Measuring up from top of unit 29 of preceding section, which is here a bench of purple-red weathering ss and siltstn about 2' thick.

(1)	1.7	Interbedded sltst & very fine-g ss, fg wpkg lcc, weathers purple-gray and red, thin beds to laminated, with some gray white weathering shaly silted, in upper part.
(2)	1.5	Sandstone, fine-grained, thin-bedded beds to 0.5±, rippled, worm trailed, weathers rusty brown
3,	2.8	Siltstone, shaly & silty shale, gray
(4)	3.6	Sandstone, thinly interbedded with s. gray shale, ripple marks, fucoids plat. outcrop
(5)	8.6'	Sandstone, fine grained, lwr 2 ft in beds up to 1.0+, partings of gray shale, ripple marks
	16.12	

abundant on bedding planes as [illegible] worm' mkgs. Weathers rusty brown. Ripple cross stratas 10° to 40° NE locally, [illegible] bedding plane trim, few show cf. Current rips steep NW gentle SE.

@ 6.0

Siltstone. Irreg thin-bedded, becom shaly at top. Basal 0.2' is white weathy silt, irreg fg stained bedding, loc finely sndy, upper half platy to shaly, with S. + gray shale & shaly silt. Local thin [illegible] coarse qtz sd.

@ 3.0 - ?

Sandstone, fine grained, cross-bedded, weathers brown to [illegible] brown, [illegible] bed. to 1.0 shaly [illegible], top eroded.

- Top of this is [illegible], not more than 10.0' from [illegible] with Shl Creek, but not possible to [illegible].

Gully draining old quarry on N side Fall River directly across from Evans Quarry.

Base of Evans Quarry SS - (short, incorrect)

(6)
2.0 Sandstone, sandy, hard, loc. platy with buff + purple stain, plant frags and some clayey inclusions Forms buff weath ledgy grades loc into fine ss

(5)
1.8 Siltstone, dk gray, massive, hard subconch fracture, grades down (+ lat.) to unit below

(4)
5.4 Siltstone, calc, sandy, massive fractures in big subconch blocks is wavy, lam with fine ss. + has plant frags.

(3)
5.6 Claystone, silty, shaly black, with wavy interbeds dk gray clayey silt. Becomes silty at top grading to unit above. At base becomes sandy

(2)
24.4 Sandstone, fine to coarse grained, with conglomeratic beds, massive, cross-bedded. Thin bed sandy siltst 6.0 from top weaths white. SS weaths red sh

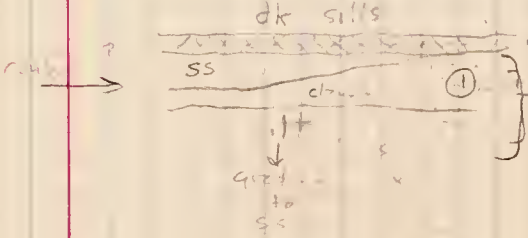
brown.

About 0.5 top ss then 1 layer slightly grnby light gray clstn then another 1.0± Fe stained red with loc. calc accumulations This capping interval qtz ss without sharp contact to ss below

① 0.4→? Clystone, gray, slightly silty, subconchoidal.

Offset to cut about 70 yards SE along road from section above.

Base unit 3 of preceding section rests on a ferruginous silty ss about 0.4, but laterally ss in under this ferruginous cap



① Up to 1.0 light gray clstn. mottled pink & purple, highly spherulitic at base.

② Purple silt-T, spherulitic, grdg

within 1 to 2 feet into the conglomeratic sandstone.

Cascade Springs quad. Red Gulch section

Rough section from Minnewasta up. Mostly along old road cut through gap in ridge just W Bridal Veil Spgs.

6.0+8.0	Sandstone, massive, weathers orange-red
3.0	Covered
6.0	Limestone, fine-grained, gray (Minnewasta) in thick massive beds
10.0	Claystone, chiefly olive to gray at base, where it contains some thin interbeds limestone in basal 1.5 ft. Above 1.1 it is dark red and calcareous, upper 3.0 ± is medium dark olive clay
5.5	Covered by slump except for upper foot which is fine-grained sandstone locally, sandy clay.
9.0	Sandstone, fine-grained, massive, ripple-bedded or cross-bedded, but fine may be weathering phenom. Light to light yellow-brown. Has white clay blebs throughout 2mm ±. Top yellow stained with 0.2 ± silty

brown, ferruginous carb.

1.1 Claystone, gray to black waxy, upper half shaly with laminae silt and fine gr ss.

2.4 Sandstone, in two thin beds at top and base, 0.6 and 0.4 resp., separated by sandy gray shale interlam. to thinly interbedded with sandstone, ss and f gr grained, lower [illegible] bed, upper sdy, silty.

3.0 Claystone, gray & dark gray waxy.

0.4 Ss, fine to v gr grained irreg. interlam with sandy gray shale

10.5 Claystone, waxy dark gray w. base half becoming greenish gray in upper half with two bands maroon, upper 0.5 w. nodules yellowish green.

1.2 Sandstone, fine to very fine gr. ss impreg. wreaths purplish rust brown.

11.5 Claystone, silty to finely sandy, basal 4.0 dominantly a clayey sandy siltst, banded purple and greenish gray, upper part chiefly gray with purplish cast locally.

14.0 ± Clayst[illegible] partially obscured by slope wash. Basal 5.0 is a dark purplish gray weathering to lighter purple outcrop. Is finely silty locally. Upper 2 to 4.0 ft is a sandy gray clayst[illegible], rest obscured by slump.

Brush

33.0 Sandst[illegible], c[illegible] fine to med grained, tabular, x-bed, to cross [illegible] with thin [illegible] and partings of shale [illegible] gray silty SS and siltst[illegible]. Upper mas[illegible] fairly calc[illegible] also worm burrowings on some [illegible]. Some [illegible] very [illegible]. Weathers yellow [illegible].

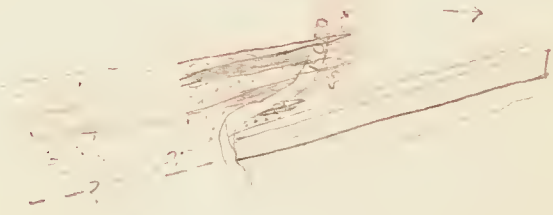
A 1.0 ft zone about 5' from top has [illegible] to granular stringers & loc. a granule layer or [illegible] & sandy siltst. on

surface. Bed 5.0 also has coarse layers loc.

Up slope to N along hogback looks as though dipping with 2 separate ss joined, upper fill-channel-like, lower is well-rounded x-bedded + grn, coarse,

Rechecking at cut whose measured. Lower 14.0 is the med gr to loc. coarse grn massive x-bedded, well-x-bedded with stringers of clay chips on some x-beds. At top some contorted beds + irreg. intrusive ss, pink + yellow wx. Lighter + more poorly sorted than ss overlying it. Wx. in yellow bands, rounded cobbles, more friable than ss above. Has minor vague zip inks + tan trails in sdy beds + top.

Upper 19 ft chiefly in angular-weathering, tabular beds of fine gr ss. with



local coarser bed already noted and platy sand sh. most all ss surfaces well rip mkd, + some 'worm-trailed' ss is ridge-former brown weath. Loc calc. areas Loc. Fe areas.

Note. Abund ss.
Clean-cut interval [illegible] but within 100 feet some carbon bearing almost entirely massive sandstone which appears to replace most of underlying ss unit as well. (See sketch above)

Ran [illegible] in [illegible]

1.0	Shale, gray, silty, plant traces
0.6	Sandstone, massive, med to fine gr, includes shale chips, weathers brown, loc. Fe stained.
16.0±	Shale, gray, silty, with upper half weathering reddish-brown, plant traces thruout.

Shaly structure of siltstone/claystones in this core may be secondary — structural.

1.8	Sandstone, fine-grained, with clay pellets, in massive beds 0.1 to 0.7, weathers pinkish brown, loc. Fe conc.
4.2	Siltstone, shaly, gray, plan fract, with upper 2.5 ± dried red, upper 0.5 ± is Fe impreg ~~irreg~~ thin ss irreg interbedded with siltst.
7.0	Shaly, silty grn shaly siltst. gray mica rec sl., micaceous, plan fract.
1.4	Sandstone, very [illegible], Fe impreg, red to purple mottled thin beds ss interbedded with shaly siltst.
7.0+	Siltstone, shaly, calcar silty shaly [illegible] gray, becom mg light greenish gray, with + purple stain in upper 2.0 - 5.0
1.4	Sandstone, shaly, with thin interbeds very fine-grained sandstone.

10.0	Sandstone, shaly to more massive with some silty shale and a few Fe impreg thin beds very fine-grained ss, chiefly purplish gray some greenish scat. carb frags
7.5	Obscured by slope wash.
4.0	partly obscured, upper half is shaly gray claystone.
2.5	Interbedded (thin) gray silty sands and siltstone, and, in upper 2.0 thin beds very fine grained sandstone.
3.6	Shale, grey to black in upper 2.0 with paper carb shale 1.0 to 2.0 from top. Below this silty sh to shaley silt.

off from a down about ⅓ way to bottom canyon.

2.10±	Sandstone, fine to very-fine-grain, micaceous, laminated to irregularly bedded, weathers brown.
3.9	Chiefly obsc, gray shale with interbeds siltst.

2.3	As in next ss above, but upper foot has been "rolled".
3.0	Claystone, shaly, grading at base to siltstone, grey, with red stain, spherulitic throughout.
1.5	Sandstone, fine grained, 1cm to x 1cm, loc. sat. [illegible] Fe impreg.
14.0	Cliffing observed by slump, lower 4.0 ± is [illegible] siltst & silty shale, brownish grey with plant frags., and interbed. fine gr. ss. At least upper 2.0 is [illegible] in overlying unit
2.5	[illegible]stone, fine-grained, brown weath, [illegible] forming, in [illegible], [illegible] beds. This [illegible] locally to 5.0 ± at base of underlying sst. beds.
12.5	Lower 4.5 [illegible], shale thins [illegible] shale to 1.0 ± thick grey silty

shale with interbeds
Siltstone.

10.0± Sandstone, fine to med grained, in massive brown - yellow weathering beds up to 4.0 thick

Slope wash.

Down slope in base Canyon about 3.5 feet of slabby siltstn & silty dk grey shale on top of this ss, then which covered by thick mixed soil wash. Not far east on hill sides patches of Skull Creek crop out. Fairly sate to possum complete Fall River, but not certain.

Notes on Shoop Canyon

Fairly complete section could be had with broad offsets.

Fall River - Skull Creek contact at reservoir — then thin ss beds underlain by var. zone. Then bluff of ss - Evans gooey type & position. This overlies beds of lower Fall River - which is well exposed in NW SE NW sec. 30, T6S, R.6E, where it has well developed basal silt zone and lies on greenish clay — the actual contact obsc by slump.

Farther west up canyon in E½ NE SE, sec 23 T6S, R.5E, on SW [illegible] base [illegible] has [illegible] and [illegible] on 10± ft of massive to [illegible] ss, lies with 'overlap' [illegible]. (By this [illegible] Gulch section the basal Fall River silts are gone and FR ss [illegible] on the [illegible] up (eroded) base of massive ss and clays [illegible]. Not dug out completely, but approximate section follows.

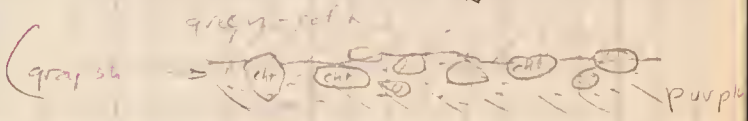
10.0' Sandstone as desc. above

17.0± Float of white chips of fine silt and hard claystone

16.0± Float of purplish claystone

9.0± Light gray to white weath clayey ss, some green sndy clstn. At about 2.6 from to a bed of sandy limestone 0.4 thick. Basal foot ± green sndy clstn. Approx top goonie float at top this interval

4.0+ Purple clayey ss, dappled green & gray. At top is sandy layer containing polished pebbles and rounded lumps sandy clstn in single layer



40.0 – wash covered

( ) sandstone in gully
(Top may be up within the 40' of wash sequence.)

This [illegible] W, not [illegible] Mnnewaste about 20' [illegible] clk gray clayst[illegible], calc[illegible] Mnnewasse [illegible] no info on thickness - is not calc locally.

Und. Mnnewaste zvc yellowish wea[illegible] SS, [illegible] lacustrine like phase of [illegible], - currently [illegible] SS.

Und. this sh[illegible] red wea[illegible] Sen. Stevens - Sc[illegible] but prob. el. vcn sage, ter. Then brown weath. unit, more bedded than red one prob. lac sp[illegible] by sulfate beds. This brown weath unit rests uncont on Unkpg - in sharp cont.

Cust prob. qd - complete section in Sheyenne, compare with prior rpt.

Tusom Canyon.

Additional to the Tusom canyon section.

Measuring on up from top of part C of the 1955 section.

7.0 Sandstone, in [illegible] beds up to 1.5 ±, partially covered, in upper [illegible] silty light grey, alternating with tan beds Fe impreg. ss which cut [illegible], considerably Fe impreg.

4.4 Covered

5.6 Clay [illegible] grey [illegible] to purple, [illegible] Fe impregnations in [illegible] 1/4 loc. carb. at top

1.2 Clay [illegible], grey [illegible] with Fe impreg. mostly on irreg. cracks and layers silt[illegible]

8.0' Covered, float of light grey, to white [illegible] clastics near base and grey white [illegible] pebbles in interbedded ss. [illegible] gr ss in upper 2 ±. Lo[illegible] top

marked.

7.0 Sandstone, fine-grained, micaceous, finely laminated to x-lam., bivd, with brown to purple Fe impreg top & base, weathers brown, forms vertical ledge, has some vert worm burrows. Some teb. beds at top. to beddg 10 ft

2.0 Sandstone, very fine-grained, with irreg interbedded silt at base and top, weathers gray white, some [illegible] size. IS irreg to x bedded doc, to teb. & curved.

5.6 Chiefly covered, basal 1.5 is a silty gray shale with siltst interbeds, weathg orange to yellow & yellow gray.

6.0 Sandstone, fine-grained, in beds up to 0.5. Silty & weathers to gray white band ledge with some pyrite impreg. Beds contain x-lam, ripples, some worm burrows.

2.5 Partially obscured, lower 1.0 ± is silty gray shale which weathers gray-white. Interval incovers sandstone laterally as overlying channel-type ss thins locally.

23.0 Sandstone, massive x-bedded to ripped. X-beds locally 15° NW. dip. ss is fine to ±medium q.s., mic. loc. with brilliant red-purple garnet stain in lower part, upper part weathers brown to grey-white with top 3.0 ± tabular, in beds up to 0.7, rip mud-lined. Locally top bed is chert-filled, has oscill rips of about 0.5 wave length. Surface is purple [illegible] veneer.

Ground covered flat.

Additional notes - Fusan Canyon

Old (1955) section pool B, includes the beds carrying [illegible] channel sand. This re-examined, no clear-cut contact visible, though in the channel to tabular, lenticular thin-bedded (the 16' of section B) to less regular, tabular, x-lam and massive x-lam beds to sharp.

Tabularity of massive ss looks in some places like gross x-bedding and the thin beds loc appear to truncate it.

Obvious in 2 rather similar bedding types adjacent to one another and no sharp contact can be mapped laterally - indeed it may be a gradation loc. ~~No doubt it is a fine type ss~~

Hermosa area

Billover Creek section of Fall River

Connected exposures in N wall of Billover Creek N½ SW¼ NE¼ sec 13 T2S R7E, in NW cor SW SE NE same, and a small knoll to E, include practically a complete Fall River section. In stream cut marked lateral changes show SS lens coming in at contact from W to E, and below contact from E to W. Two sections measured to show this.

OK 11a

Section A. West end of cut about 35' E of pinchout of upper channel. [illegible], may be as much here.) Rest on ledge. Bedding in the Lakota & measuring up. Slope wash

(4) 5.0'-? Siltstone, hard, clayey, purple and light gray with irreg. areas and vein-like bodies of fragmental Fe-cemented clayey hard siltst. Upper 2.0' is light tan finely silty brittle clstn which grades to overlying unit

(3) 6.2' Claystone, gray to brownish gray and tan in lower half, and gray to purplish gray in upper. Finely silty to very silty. [illegible]

may be spherulitic at top half. Grades to unit above

(3)

1.5 Claystone, sandy and clayey fine-grained sandstone, intermixed. Basal part includes fragmental clsts with Fe impreg silty & sndy matrix, grades up to dom. fine-gr clayey ss. Whole weathers brownish with basal 0.6 loc. Fe impreg & red.

(4)

4.3 Sandstone, fine-grained, clayey, massive, and interbedded hard sndy ~~clsts~~ siltsts. & clay siltsts. chiefly grey-white local Fe brn & pink stain, soft friable

(5)

1.2 loc clayey Sandstone, very fine grained, massive, some lenses freq. clayey, siltst. Top Fe impreg, rusty brn. & is loc. spherulitic.

(6)

1.7 Siltstone grey, weathers grey-white, loc. shaly, Some spherulites

(7)

2.1 Sandstone as in next SS below, becoming silty at top and grading imperceptably into unit above. SS is very fine gr. Thickness lat(w) to 10' + + joining ss below. To E eventually cuts out at base of the channel unit 9 below

(8)

5.6 Siltstone, gray, massive, blocky, locally clayey, spheroulitic in upper few inches. Pinched out locally to E as ss above cuts down - or that bed was light

(9)

3.0 Sandstone, fine-grained, starts as wedge-edge(w) and thickens eastward. Here it is 30' from wedge edge. Weathers yellow brown with cap and bezel 0.3' of dark Fe brown impregn.

(10) 19.0+ Siltstone, gray, irreg bedded, with interbeds sndy siltstn and dk gray shaly siltstn, loc. irreg. laminated.

(11) 3.0 Sandstone, fine-grained to very fine gr thin bedded, ripmks + "worm" trails, some silty siltstn interbed. weathers yellow green to brn.

Slope wash

Fe impreg. Cap, top + base dk Fe brn.

Section D – Knoll east of Billover Cr + tributary valley in NW cor, SW¼, SE¼, NE¼. It is chiefly covered by wash but ledges stick out. Dip 11° NE strike 15° ± NW.

Slopewash

① 3.0 – ? Sandstone fine grained, thin-bedd'd, ripple mkd, weathers yellow brown with dark rusty brn impreg on top surface and few other layers. Some shaly siltstn interbed's in lower foot

② 25.0± Upp. Lakota-like zone? Chiefly covered by slop wash in line of traverse. Lower 6.5 chiefly plastic gray shale w/ plant specs. Then 9.5± sandstone, ivory bedded v f-gr to f-gr. becom friable, becoming clayey at top, Fe impreg layers 2

③ 9.0 Rest covered – probably clayey siltstone base. Sandstone, fine, grained, thinbedded in lower 2.0±, thicker bedded above, 1cm to x lam. Some vertical worm tubes.

(4)

12.0 ± Covered, at top flaggy interbedded to interlaminated siltstone and gray silty shale are exposed. Upper 1.0 has thin interbeds Fe impreg. Sandstone.

(5)

11.0 Sandstone, fine- to very fine-grained massive, laminated to cross-laminated, brown to blackish ledge forming. Has ferruginous cap and locally ss has yellow & orange stain.

(6)

25.0 ± Covered, float & couple of post holes show slabby lite gr. siltstone with thin interbeds platy, brn weath fine gr. ss in about middle.. Some thicker sandy ledges come in the upper half, up to 1.0 ± Capped by 1.0 to 2.0 sandstone which holds crest of knoll.

Just beyond is flat on White River gravel and beyond in line of transverse deep ravine cut in Skull Creek. Laterally platy Fe impreg wormy' silts & thin ss show a slope about 10.0 above unit 6. above. This is approx. Skull Cr. contact — possibly within 5' higher at west.

Section B. — East end of westernmost cut, about 125–50 ft east section A. Starting at top of hard silty clsts in lower 3' of unit 1 of section A.

(1) 17.0 Chiefly covered. Top 1.0± is purp. red ledge of Fe impreg very fine ss to siltst up to 4' greenish gray clayey siltst. loc. exposed below it.

(2) 12.5 Siltstone and silty claystone, upper 5.0± is massive gray siltstone, scattered spherulites, becomes darker & loc. shaly near base. Under this 2.0 to 3. Fe red & purple concret. in siltst. which is rather densely spherulitic. Next 2.5± is dark purple to reddish gray finely sl. siltsts & clayey siltst. Bottom 2.0 is gray faintly pink mottled siltst.

(3) 7.5 Sandstone, massive fine-gr, to thick bedded, lam to x lam. Weathers to yellow brown vertical ledge with Fe impreg upper surface (loc. ripple marked.)

(4) 2.5 Siltstone, shaly to platy, loc. sandy

and rip-mkd, grading to unit above

⑤ 1.5 — Sandstone v fg to silty, in irreg beds up to 1.0, weaths brown + O.B. grades to siltst above below + W along ledge.

Slope West.

Section C — At west end of next face east of section B. Section begins at top of sandstone of unit 3, section B.

4.0 — Siltstone, irreg. bedded to shaly becoming sandy in upper 2.0 to 2.5 — loc z very fine-gr ss at top. Whole light gray weath

6.0± — Siltstone and very fine-grained sandstone, chiefly in thin irreg beds, laminated, with about 1.0 shaly siltst at base and interbedded with ss + silts. above Whole weaths light gray.

Mr J.G [illegible]
Brooking Station S.D.

So Dak Soil Map

5.4 Sandstone, very-fine grained, and siltstone, thinly interbedded and interlam.. Both lam + x-lam. Upper half loc 2 ledgy fine gr ss, some dark Fe stain. Chiefly light grey weath.

Split off ss part silting interval above

5.6 Siltstone, thin, interbedded with shaly siltstone and minor grey silty shale. Carb flecks throughout. Loc. some fine sandy siltst. + v f ss in middle part. Dark shaly zones restricted to basal 0.5 and uppermost 0.8.

1.4 Sandstone, very fine-grained, thin bedded, part or all Fe impreg + weath. purple brn

3.3 Shale, dk grey, silty, with laminae and scat thin beds siltstone.

0.3± Ironstone — Fe impreg silt to conc. Festone along strike.

7.8 Siltstone, shaly, to thin bedded zones, lower half with ptygs

Mad Hatters - 305 S. 10th Laramie

2nd thin interbeds dk shale ~ becomes sandy at top + contains odd Fe cones protruding into top of bed like tubers.

3.6 Sandstone, very fine-gr to silty, weathis yellow brown, thin bedded lam to single lam. bed

4.4 Shale, dark-grey, fissile at base becoming very finely silty grey upward with, thin siltst interbeds

7.4 Sandstone, loc. ± massive x lam to lem, ledge somewhat tabular in upper 2.0. Laterally (E) becomes more thinly bedded, weathis yellow brown. Red Fe cap on upper surface. Becoming surf. and ripple-mkd.

25.0± (Weath covered) About lower 15.0 is light grey to grey clay shale, slightly silty yellow stained at base. About goes to ckstn including bed 1.0± carb ckstn about 5.0 fr. m top.

4.0-? Sandstone — slabby, fgr to vfg. caps bluff. 71

Notes on 1956 Black Hills sections.

Angostura Dam.

Fall River claystone tongue – top is unit 27, extends down to unit 22, which is sort of transitory, (bottom never sharp) total 27 thru 23 is 25 feet thick.

Note that unit 22, locally thickens at expense of overlying beds, bar-like.

Evans Quarry sandstone, – is it unit 21 or units 19-20-21?

Note mention, unit 20, of the "leached" zone in shaly unit between sands.

Unit 5 – has in it fractured pebbles with unpolished fracture surfaces.

Unit 4 – ask if Fe specks spherulitic?

Total Fall Riv. types. – 130.
" Lakota " – 98.

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